The Excavating Engineer

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Reclaiming 131,000 Acres of Swamp Land in Florida

Wills & Sons and McCarthy's Contract on the Lake Worth Drainage District — Description of Dragline Operation over Soft Ground

THE Lake Worth Drainage District was organized October 15, 1915 under the general drainage laws of Florida, to make available for cultivation 131,347 acres of swamp and low-lying lands along the east coast of Florida south of the city of West Palm Beach.

What the Work Includes

The district to be drained extends from West Palm Beach to Deerfield, approximately 26 miles, and averages eight miles in depth. The east side of the district is within one to two miles of the Atlantic Ocean, and the Florida East Coast Railway and Dixie Highway parallel the district boundary on the east. Small towns, which are established shipping points, are located every few miles near the eastern boundary of the district. Benefits are assessed against 123,761 acres within the district. The total bond issue for the completion of the work amounts to $2,778,000. This will provide funds for the construction of the water control, as well as the canals and laterals. The contractors for the entire job are Wills & Sons & McCarthy, of West Palm Beach, Florida.

The entire acreage within the district will be available for cultivation when the project is completed. Work has already proceeded far enough so that approximately 20,000 acres of fresh water muck land in the eastern portion of the district is now available for cultivation, and suited to the raising of sugar cane. It is also a most excellent trucking soil.

Excavation Necessary

510 miles of canals and laterals will be included in the Lake Worth Drainage District. There will be 350 miles of small laterals with 4- to 8-foot bottoms and an average cut of 4 feet, and 160 miles of equalizing canals and outlets ranging from 16 to 50-foot bottoms and averaging from 10 to 14 feet in depth. The total yardage of excavation is 8,522,000 cubic yards. On October first of this year the excavation was 81 per cent completed. The monthly output of yardage at the present time amounts to 450,000 cubic yards.

Class-9½ Bucyrus dragline working in a big cypress swamp. The water here is 5 feet deep and the muck is over 100 feet deep.

The map which we publish herewith gives a clear idea of the general layout of the job. This also shows how the water will be controlled and gives the location of the excavating machinery on August 1, 1921.

The character of the soil throughout the district is usually sandy, and it is desirable to hold the water level within 2 to 4 feet of the surface of the ground for best results in the cultivation of the land. The numbers within the circles on the map show the locations of the water controls, which are concrete dams with Taintor gates of capacity sufficient to carry off the flood water.

The small laterals which are half a mile apart collect the water from the farm ditches and carry it into the equalizing canals, which in turn carry it to the outlets. The gates of the water controls are operated so that the water is kept at the desired level within the unit. During excessive rains, if

Getting a bucket full of the sandy soil. This gives a good idea of the character of the digging.

One of the Larger Canals Dug by the Draglines

Cabins for the crew of one of the draglines. These can be easily mounted on wheels and moved.

Another View of the Bucyrus Class-9½ Dragline Shown in the Left-Hand View Above

necessary, the equalizing canals will serve to carry surplus water to the next unit for discharge through its control which may not be so heavily taxed if the storm is a local one.

The main discharge canal connects all the fresh-water lakes in the east end of the district. Its bottom width varies from 35 to 50 feet and it has two outlets, one at Boynton discharging into Lake Worth, the other at Deerfield discharging into the Hillsborough River.

Excavating Equipment

The excavating equipment on the job consists of one three-yard floating dredge, one two-yard floating dredge, three Bucyrus Class-9½ steam operated, caterpillar mounted dragline excavators, equipped with 45-foot booms and 1½ cubic yard buckets, and two Bucyrus Class-7 gasoline operated dragline excavators, mounted on caterpillars and equipped with 42-foot booms and 1 cubic yard buckets.

As stated, the location of these machines on August 1, 1921, is shown on the map.

Dragline and Dredge Operation

The principal construction feature followed out was to cut the large canals with the floating dredges, allowing the water to drain out of the area of the district to make dragline operation easier. The draglines were operated so that the ditches would drain, as sand encountered in this territory is very difficult to excavate under several feet of water.

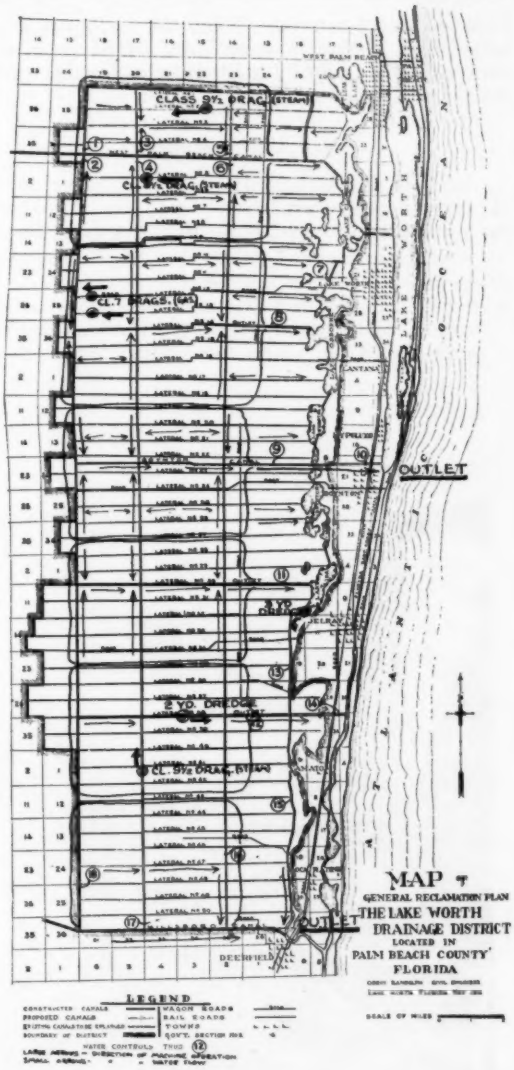
The material handled by the draglines is largely sand varying in degrees of fineness. Considerable quicksand has also been encountered. At several places in the district a soft limestone rock was encountered which it was necessary to blast. Drilling did not prove to be a very difficult problem, however, as the rock was so soft that pipe could be driven into it. Various spacing of holes were used.

Hardpan was also encountered in almost every portion of the district. Hardpan, as spoken of in Florida, is sand that has been filled in with vegetable matter. This gives the sand the appearance of rock after it is excavated. Its color varies from brown to black and after the hardpan is exposed to air and water it readily disintegrates.

Considerable muck was encountered in all the ditches and caused some difficulty in the operation of the heavy land machines, especially when the muck areas were small. The small laterals in the large muck areas were excavated by Bay City machines with very large feet.

Dragline Operation over Soft Ground

To support the Class-9½ Bucyrus draglines when operating over soft spots, large pads were



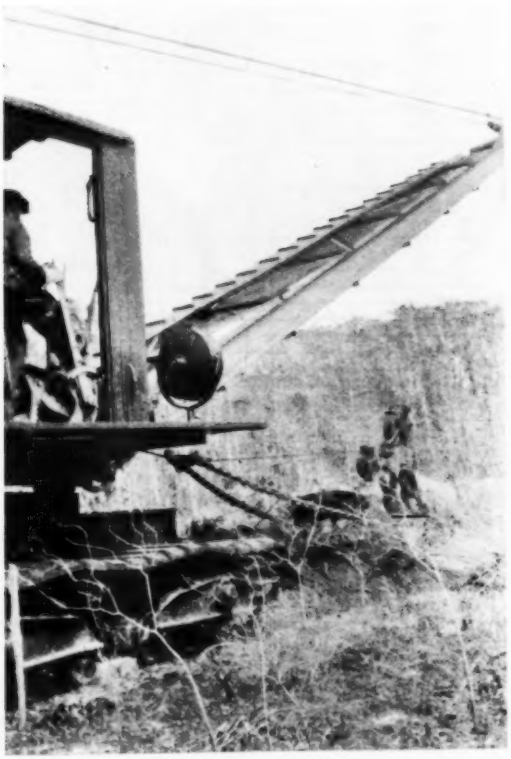
built of 3 x 10 inch plank, very well bolted together so that the pad was from 5 to 6 feet in width, 24 feet long and 9 inches thick. Two rings were fastened in each end of the pad and connected with steel cables or chains. Two chains with hooks were fastened to the loading chains on the buckets and hooked into the cables in the pads for swinging. The use of pads distributes the weight of the machines so that they have been able to cross some very soft places. When it was necessary to move the pads with the machines from one soft place to the next, the pads were usually thrown into the ditch, and attached to the dragline with a cable, so that they were dragged by the machine as it moved up, and were available when the next soft

place was encountered. When the soft spots were infrequent, the pads were transported from one location to the next by large wheeled logging carts pulled by a tractor.

Dragline Outputs

In spite of the difficult conditions under which the machines operated, some very creditable outputs have been made by the Bucyrus draglines.

Attention is called to the fact that conditions of operation under which these outputs were made were very difficult, and that many delays due to fuel shortages, soft ground, etc., were inevitable. Conditions varied too much for detailed description.



One of the headlights with which machines are equipped for night work. Two of these are mounted on a machine, one on each running board, and they are focussed into the pit.

For example, the Class-9½ Bucyrus dragline was used on ditches varying in bottom width from 4 to 8 feet with a 4-foot cut. On a small ditch such as this, travel is naturally rapid. The cross sections of other ditches were of such dimensions that the machines had to make a double cut to excavate the sections, travel was much slower and conditions of operation entirely different.

The outputs given below are for total working time on the job, and no attempt has been made to pick out favorable periods.

Machine	*Description*	*Date*	*Mos.*	*Average per Mo. Cu. Yds.*
904	Class-9½ Bucyrus Steam Dragline	Oct. 1920 to Aug. 1921	11	33,579

This machine was operated under bad field conditions. Many stumps, frequent soft places, scarcity of wood for fuel and bad transportation for fuel on small ditches made operation difficult. The travelled mileage was considerable.

Machine	*Description*	*Date*	*Mos.*	*Average per Mo. Cu. Yds.*
2498	Class-9½ Bucyrus Steam Dragline	Nov. 1920 to Aug. 1921	10	50,518

This machine was on a ditch of very good section, but in some instances had to double cut to dispose of the material. There was a large percent of rock in this output—the surface conditions that this machine worked in were exceptionally good and fuel was handy. The contractors consider this an exceptional record for a dragline of this size.

Machine	*Description*	*Date*	*Mos.*	*Average per Mo. Cu. Yds.*
921	Class-7 Bucyrus Gasoline Dragline	Mar. 1920 to Feb. 1921	12	18,790
922	Class-7 Bucyrus Gasoline Dragline	Mar. 1920 to Dec. 1920	10	13,682
923	Class-7 Bucyrus Gasoline Dragline	Apr. 1920 to Aug. 1921	17	19,490
924	Class-7 Bucyrus Gasoline Dragline	Apr. 1920 to Aug. 1921	17	18,030

All material is overcast.

The draglines are always worked on a double shift, with the exception of times when they get into a particularly dangerous place on account of soft ground. Then the machine is usually single shifted until this point has been passed. The machines are operated for two ten-hour shifts, that is, ten hours of actual working time per shift.

Output on the night shift is about the same as the day shift except where many stumps are encountered. Then the night crew is handicapped slightly on account of lighting.

The lighting of the machines for night work is by steam turbine generator. The lighting of the pit is done by two large headlights mounted on the running board on the cabin on each side of the boom, and focussed into the pit.

Many pine and cypress stumps are encountered throughout the district. The pine stumps average 10 inches in diameter and are blown out and split with dynamite. The cypress stumps are usually small, and are in most cases excavated by the draglines and dredges without blasting.

Dragline traveling on pontoons through a cypress swamp. The machine is supported on pads made of 3 x 10 plank.

Other Features of Operation

In some sections of the district, fuel is very scarce and its transportation through the sand is very difficult. The contractors have made quite a saving of fuel by lagging the boilers of the Class-9½ steam operated machines. Aside from the saving of fuel the fireman and operator are protected against excessive heat.

The gasoline for the Class-7 gasoline draglines is delivered in drums at the end of the nearest hard road. From this point it is delivered to the machines by mule teams or tractors.

Description of the Camps

The headquarters of the construction work is at Boynton, Florida. The warehouses and machine shops are located there on a spur of the Florida East Coast Railway. This location is also on the banks of one of the large outlet canals so that water transportation in the larger canals is available to a certain degree.

The machine shop at this location is equipped to make every kind of repair. A very completely equipped automobile and truck garage and repair shop is also maintained at this point.

Crews in the field are quartered on the floating dredges and crews for the dragline machines are quartered in cabins which are mounted on wagons so that camps can be moved on very short notice. Where possible, draglines are worked in batteries of two, otherwise, three cabins are provided for the crews of one dragline, one cabin being used as kitchen and dining room. The cabins are moved by mule teams or tractors, depending on the condition of the soil.

The General Superintendent in charge of field operations for Wills & Sons and McCarthy is Daniel Downey. Henry Cook and Jess Johnson are foremen in charge of dragline operations. The foreman of the floating equipment is E. Felton.

Work on this drainage district was started shortly after the first of the year in 1918 and will be completed on or before June 1, 1922.

Handling Rock with a Shovel Operated by Compressed Air

How the Union Rock Co. of Los Angeles Cut Operating Costs in Their Quarry — Comparison of Steam and Compressed Air Operation

ABOUT a mile outside of the already famous town of Hollywood, California, hidden away in a narrow gorge known as Brush Canyon, is one of the quarries of the Union Rock Company of Los Angeles. This quarry was opened about January 1, 1921, and operated by hand labor until February, when a Bucyrus 30-B caterpillar steam shovel moved on the job, or rather it was a steam shovel when shipped but upon arrival it was installed for operation by compressed air.

When first opened this quarry was operated by means of an old "glory" hole which opened out at the top of the hill and extended down into it about 50 ft. From the bottom of this "glory" hole a tunnel leads out through the hill to a point about 100 ft. up its side and affords the entrance to the quarry. This tunnel is about 500 ft. long and before the shovel was installed was just large enough to permit of hauling dump cars from the quarry face to the crushing plant which is set up along the side of the hill below the tunnel.

When the 30-B Bucyrus shovel mounted on caterpillars arrived in February of this year, it was erected at the bottom of the hill and run up to the quarry under its own power, digging its own way by widening an old trail running up the hill at about a 12 per cent to 14 per cent grade. The tunnel was enlarged to allow the shovel to pass through into the "glory" hole where it has been in operation ever since except when blasting was going on. when it is run back into the tunnel to protect it from flying pieces of rock.

Compressed Air Operation

The most unique feature of the work of this machine is, of course, its complete operation by compressed air. A 12" x 14" single stage air compressor manufactured by the Chicago Pneumatic Tool Co. is being used. This compressor has a theoretical capacity of 530 cu. ft. of free air per minute, but under the operating conditions actually delivers about 430 cu. ft. of air per minute at 250 R. P. M. The compressor is driven by an 85 H. P. D. C. motor which in turn is operated by power from a D. C. transmission line a short distance from the quarry. The air from the compressor, which is located on the side of the hill outside of the tunnel, is delivered to a receiver tank which has a volume by actual measurement of 250 cu. ft. The boiler on the machine also acts as a receiver in addition to the tank near the compressor. About one thousand feet of 3-inch piping is used to carry the air from the compressor to the shovel at the far end of the tunnel which is about 500 ft. long.

The air enters the machine through the pipe used for water on the steam machine. This pipe is connected through a Barco ball joint to the lower end of the vertical propelling shaft and the air passes through the hollow center of the shaft, thence through another ball joint at the top and through the regular piping to the boiler following the usual path of the water and steam so that no changes in the original steam piping were necessary.

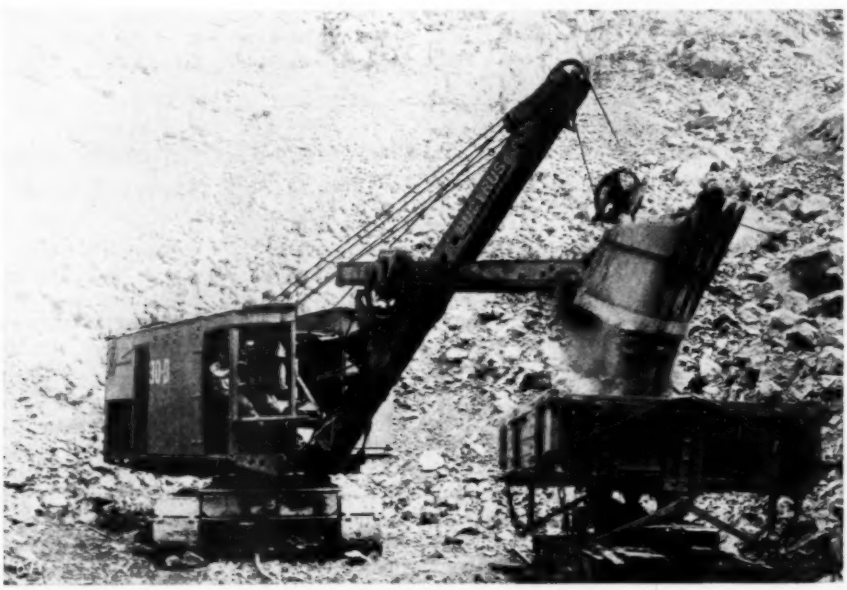
Although this operation has been extremely economical and satisfactory it has been found from

Drilling Operations in the Quarry

experience that the present compressor capacity is a trifle small as there is difficulty in keeping the air pressure at the machine up to the proper point with the present equipment. Under continuous operation the air pressure at the machine drops to about 70 lbs. per sq. in. and the shovel is "logy" and not as quick acting as it should be and is when the air pressure is kept between 90 and 100 lbs. per sq. in. which has proven to be the best operating pressure. However, since the shovel is not loading continuously, this difficulty is not serious although a larger compressor would be more satisfactory.

Operating Costs

The Union Rock Co. is extremely well pleased with the machine and it has been proven that a considerable saving has been effected over the cost of operation of a steam machine burning fuel oil,



Dropping a dipperful of rock into one of the 4-yard Western cars. H. Margison is at the levers. The rock is a tough porphyry.

which is the usual type of equipment in this section of the country. Under conditions such as these, where cheap power is available and it is necessary to burn oil on account of the high cost of coal, a general idea of the saving effected by using compressed air may be obtained from the following figures:

Steam Operation

Fuel Oil — 4 bbls. per day @ $2.50 per bbl...	$ 10.00
Fireman @ $4.50 per day.....	4.50
	$ 14.50 say $ 15.00
Monthly cost (26 days).....	$390.00 say $400.00

Compressed Air Operation

Power at $1.00 per H.P. per month.....	$ 85.00
Half salary of compressor operator.....	65.00
Maintenance and repairs on compressor, Misc.....	25.00
	$175.00

Saving per month, $400.00 — $175.00 = $225.00

In connection with the above it should be noted that the air for the drills in the quarry is furnished by an entirely separate and independent compressor which requires the attendance of one man anyway, and since the same man can take care of both compressors only half of his salary is charged to the shovel. In addition the item of $25.00 per month for compressor maintenance, repairs and miscellaneous expense is undoubtedly high. Another point is that there is practically no depreciation of the boiler, and in fact it is probably in better condition than if it were idle because of the oil carried into it by the air and deposited on the boiler tubes.

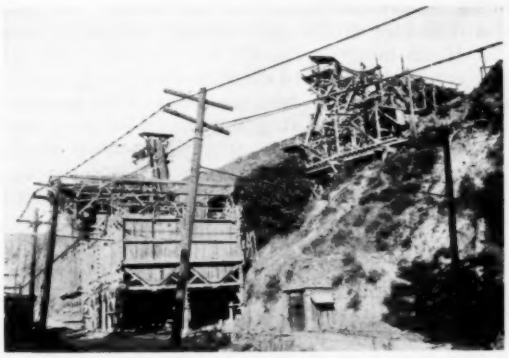
Quarry Operations

The nature of the quarry operations is very similar to that of any other quarry of the same kind. The rock is drilled and shot around the sides of the "glory" hole in front of the tunnel, and loaded by the shovel after the large pieces have been broken up by blasting.

It might be stated here that the tunnel is of considerable advantage as the shovel is backed into it and kept fully protected whenever blasting is being done.

The material is loaded into 4-yd. 42-inch gauge Western dump cars which are pulled out through the tunnel by an electric hoist and dumped directly into a No. 8 Gates, type K, gyratory crusher. From here the rock passes over a scalping screen where the oversize pieces are removed and the remainder passed to a 48-inch Symonds disc crusher. From this crusher the material is elevated to a series of screens and separated by successive screenings to 1¾", 1" and ¼" sizes. A 24" Symonds disc crusher is now being installed to reduce the 1¾" rock to smaller sizes by re-crushing. The finished rock is delivered into bins which are elevated to the proper height to discharge through hoppers directly into trucks underneath at the road level at the foot of the hill. There are six bins at present and six more are to be installed.

The daily output in 9 hrs. is about 350 cu. yds. which is the capacity of the crushing plant. The shovel is only working about 50 per cent of the time, but in the near future the capacity of the plant will be increased to 600 cu. yds. per day, which will mean more continuous shovel operation.



The Crushing and Screening Plant Located on the Outside of the Mountain, and Connected with the Quarry by a Tunnel

The rock is a sort of trap rock and very similar to blue granite. The entire output is used in Los Angeles and delivered by truck, as the plant was originally put in to take care of this local demand under war conditions in order to relieve the demand on the Company's larger plants and eliminate freight shipments into Los Angeles. The rock is used mainly for concrete for roads and other construction.

As a result of their experience with this shovel, the Union Rock Company is considering the use of compressed air instead of steam on their railroad type shovels, of which they have several.

A great deal of the credit for the successful operation of this plant is due to Mr. Emil Higuera, Superintendent, and Mr. H. Margison who is running the 30-B.

"I vish I vas as religious as Abie."
"And vy?"
"He clasps his hands so tight in prayer he can't get them open ven der collection box comes around."

The Judge (to prisoner)—"When were you born?" (No reply.) "Did you hear what I asked? When is your birthday?"
Prisoner (sullenly)—"Wot do you care? You ain't goin' to give me nothin'."

Teacher—"Define trickle."
Boy—"To run slowly."
Teacher—"Define anecdote."
Boy—"A short, funny tale."
Teacher—"Use both words in a sentence."
Boy—"The dog trickled down the street with a can tied to his anecdote."

Alignment Work Over the Tehachapi Grade on the Southern Pacific

Marsh Bros. & Gardenier Working on Tunnel Elimination and Track Re-alignment in California

TO the contractor who has been in the game for a good many years this short description of railroad construction work will no doubt be interesting, if not refreshing, and may be a reminder of the days when this kind of work was at its height.

Very little railroad construction has been done in California in the last few years with standard railroad shovels, and it is therefore doubly interesting to note the work that the Southern Pacific Company has been carrying on in the Tehachapi Pass where they have concreted several tunnels and in other places entirely eliminated tunnels.

Two of the tunnels eliminated were No. 12 and No. 13 involving a total length of about 1300 ft., and the change in alignment necessary to eliminate these tunnels involved a change in track covering about 2800 ft. in length. This work was carried on this past year by Marsh Bros. & Gardenier of San Francisco, who handled the contract for the Utah Construction Company. The work involved the handling of about 125,000 yds. of material, the deepest cut being 134 ft. The maximum curvature on the new alignment is 10°, which is the same as the maximum on the balance of the line over the Tehachapi. This work was completed during a period of about six months and was all handled without any delay to the traffic, although the work was done within a few feet of the main line.

The Bucyrus Shovel Removing a Large Slide

On this work Marsh Bros. & Gardenier used a 70-C Bucyrus shovel, their other equipment consisting of two Vulcan 15-ton dinkeys, one 18-ton Porter dinkey, and twenty-seven 4-yd. Peteler 36-inch G. dump cars. One of the photographs shows the 70-C loading cars over the main line track. The

(Continued on page 380)

70-C Bucyrus Shovel Loading Cars over the Main Line Track, on Tunnel Elimination Work on the Southern Pacific Railway

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Bradlee Van Brunt, Manager and Editor

South Milwaukee, Wisconsin

The Steam Shovel—Builder of Worlds

It has frequently been claimed in the past by steam shovel men of the old school that there are few pieces of machinery, with the natural exception of the locomotive and the automobile, that have played a more important role in the commercial and physical development of this country, over a long period of years, than has the railroad type steam shovel.

However this may be, a study of the number of railroad type shovels sold from 1880 to the present time, and an attempt to classify these machines among the industries who purchased them, indicates in a striking manner how closely this machine is related to our great eras of construction and industrial expansion.

Although the first steam shovel was built as early as 1837, it was not until the early eighties that the development of this machine was put upon a manufacturing basis, when the two larger companies now building steam shovels were organized. The Bucyrus Foundry and Manufacturing Company (now Bucyrus Company) in 1880, and the Marion Steam Shovel Company in 1884.

Before the year 1887 the sale of steam shovels, although almost entirely to railroad companies, had not attained sufficient volume to be in any way marked. With this year, however, we observe a big increase in the purchase of these machines by railroads and coincident therewith, the beginning of the era of railroad construction in the United States. From then until the beginning of the Twentieth Century, a period of about fourteen years, the railroads were the principal purchasers of these machines. The only exception to this rule were the years 1892, 3, and 4, which it will be remembered were slack years for business in general. It was then, however, that the Chicago Drainage Canal was started, the building of which may be considered the first great landmark in the development of the modern, high-powered steam shovel. It was then for the first time that steam shovels in any number were used on one big construction project, it was the first time that steam shovels on a job, watched by engineers the country over, were put up against extremely hard digging. It was here also that famous earth movers, such as McArthur Brothers, Griffith and McDermott, Qualey Construction Company, D. D. Streeter, E. D. Smith and others, the fathers of a mighty line, got their first early shovel experience.

But the day of the big railroad contractor did not actually dawn in real earnest until after the beginning of the great railroad construction boom in 1899. It was then, for the first time, apparently, that railroads found that their roads could be built cheaper, better and quicker by contractors who were specialists at the work, than by their own forces. From 1899 on, therefore, we find a slow but steady decrease in the number of shovels bought by railroads and a proportional increase in purchases by contractors. The years that followed were indeed the Golden Age of the railroad contractor.

Figures for the iron mining industry are also interesting. The first general shipment of machines into Michigan and Minnesota was early in the nineties, when the independents were starting the operation of open pit mines. This increased steadily as the industry grew until it reached its high point in about 1905, when the U. S. Steel Corporation began its great development and started operations on a big scale.

Quarries and brick plants were perhaps slower to use steam shovels on a large scale, but it is interesting to note that it was not until 1909 and 1910 when the country was emerging from the business depression brought about by stringency in our currency, that we note any marked jump in purchases by quarries. It is interesting to note that this checks very faithfully with the beginning of the extensive use of concrete for building and road construction.

Any sketch such as this would fail if it did not point out the great significance of the building of the Panama Canal between 1904 and 1913 where one hundred American steam shovels showed the world at large how excavating machinery could conquer nature. This indeed is the greatest international landmark in the development of earth moving machinery to do the impossible.

Whether or not the steam shovel can be rightly considered as among the greatest tools in the development of our country, industrially and physically, may be open for debate. However that may be, we are here to state that without the perfection of that machine, the greatest railroad systems of this country could not have been built when they were; the great iron mines of Michigan and Minnesota could not have supplied the manufacturers of the country with the enormous tonnage of ore

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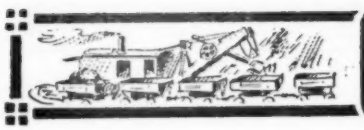

· FIELD NOTES ·

Using Standard Pipes as Columns or Struts

How to Be Sure that They Are Strong Enough

By W. F. Schaphorst

Standard pipes often come in handy for use as columns or struts or for use as "push members" in transmitting forces. This is because a pipe is strong both in tension and compression. Due to its circular form it is ideal for resisting compressive forces.

However, when it comes to "figuring columns" it often takes considerable time digging around in handbooks, etc. and as a result the use of a pipe is avoided. Or, a pipe much too large or too small is used, chosen entirely by "guess." The pipe that is too small may fail and be the cause of disaster. It is always best, of course, to be on the safe side, but at the same time one should practice economy.

To assist those who may have occasion to use standard pipes in this way and to make it as easy as possible for them, I have developed the following simple table and rules:

Size of Pipes Inches	Column A Maximum Length Inches	Column B	Column C
1/8	14.5	826.4	0.07
1/4	19.4	617.3	0.12
3/8	25.	480.8	0.17
1/2	31.3	383.1	0.25
3/4	40.	300.3	0.33
1	50.6	237.5	0.50
1 1/4	64.7	185.5	0.67
1 1/2	75	160.5	0.80
2	94.7	126.9	1.07
2 1/2	114	105.3	1.71
3	139	86.21	2.24
3 1/2	161	74.63	2.68
4	181	66.23	3.18
4 1/2	202	59.52	3.68
5	226	53.19	4.32

1. Knowing the load that is to be carried and the length of pipe needed, make a "guess" as to the size of pipe. Column A in the tables will help in making the guess as it gives the maximum length of pipe that may be used. Thus, never use a 1/8-inch pipe, as an important column, longer than 14.5 inches. Never use a 3-inch pipe, as an important column, longer than 139 inches, etc.

2. Multiply the length of the pipe in inches by the corresponding figure in Column B of the table. This product should never be greater than 12,000. If it is greater than 12,000 it means that you have guessed a pipe that is too small. After getting the right size,

3. Subtract the product from 19,000. If the difference is equal to or less than 13,000 use it, in (4). If the difference is more than 13,000 use 13,000 in (4).

4. Multiply by the figure in Column C corresponding with the pipe size.

The result is the number of pounds that the pipe will carry as a column, strut, or "push member." If the result is less than the load to be carried, try again, using the next larger pipe size, and so on until the proper and most economical size is selected.

For example, it is desired to support a load of 10,000 pounds at a height of 84 inches. What size of pipe should be used? Following the rules we do this:

1. "Guessing" the size of pipe, Column A shows that 84 in. falls between 1½-inch and 2-inch pipe. We will therefore try a 2-inch pipe.

2. 84 x 126.9 = 10,650. This is less than 12,000 and we will therefore continue.

3. 19,000 — 10,650 = 8,350. This is less than 13,000 and we may therefore use it in (4). If the difference were 18,350 we would have to use 13,000 in (4).

4. 8,350 x 1.07 = 8,950 pounds.

Since 8,950 pounds is less than 10,000 pounds a 2-inch pipe is too small. We will therefore recalculate, this time trying a 2½-inch pipe.

2. 84 x 105.3 = 8,850

3. 19,000 — 8,850 = 10,150

4. 10,150 x 1.71 = 17,370 pounds.

This shows that a 2½-inch pipe would be amply safe to hold up 10,000 pounds. It shows that a 2½-inch pipe is capable of holding almost twice as much as a 2-inch pipe at a height of 84 inches. The small difference in pipe sizes and the great difference in strength indicates the necessity of careful computation and the danger involved in guesswork.

How to Carry Swinging Cables

There is considerable difference of opinion among dragline operators as to the best method of carrying swinging cables on dragline excavators of the older type which are swung in this manner. The practice among many has been to carry them loose or just tight enough to stay in the sheaves; others claim that this practice results in frequent breakage.

Robert M. Rogers of Chester, Va., one of the experts of the younger generation advises us that he has always carried them tight and has got fourteen months' continuous service from the last pair which he took off which happened to be 7/8", 6 x 19. We recommend this practice to dragline operators.

"All right there?" called the conductor from the front of the car.

"Hold on!" came a feminine voice. "Wait till I get my clothes on." The entire carful turned and craned their necks expectantly, as the girl got on with a basket of laundry—that was all. Ding! Dong!

DEVICES YOU OUGHT TO KNOW ABOUT

The Bates Steel Mule

The photograph which we publish herewith, shows a Model "G" Bates Steel Mule operating three ¾-yard Roytrac wheel scrapers in shale, on a road grading job in Indianapolis. C. A. Wilson is the contractor for this work. The average load per ½-mile trip is two yards and the time required is nine minutes.

The Bates Steel Mule in Action

The effectiveness of the Bates Steel Mule as a time and money saver is clearly shown on this job. To accomplish the same work with horses requires nine three-horse-drawn scrapers and one snatch team, making a total of ten teams and ten drivers, at an operating cost about three times as great as with the tractor.

For more detailed information in regard to the Steel Mule, write the Bates Machine and Tractor Company, Joliet, Illinois, using for convenience one of the blank postals enclosed in this magazine.

Superheated Steam in Small Locomotives

Small locomotives, as referred to in the following article, include those of 30-ton weight or under, operating on all gauges of track and are those ordinarily used in all classes of service, such as industrial plants, quarries, logging operations, borrow pits, gravel pits, coal and metal mines, contracting service, etc., where heavy grades frequently prevail.

The operation of this class of locomotive differs in one important respect from locomotives used in railway service, in that these small locomotives are not operated for revenue, whereas, railway locomotive operation costs are chargeable directly to freight and passenger transportation. Small locomotives are a necessity for the service in which they are used, but their costs of maintenance and operation which cannot be offset by revenue must be charged as an expense and included in the overhead of the industry or service in which they are used. With fixed charges already high, it is more important today than ever before to give thought and study to ways and means to reduce operating expenses.

One practical way to reduce the operating costs of small locomotives is to equip them with steam superheaters, whereby the full benefits derived from the use of superheated steam are obtained. Every advantage of superheated steam reflects tangible savings in the cost of small locomotive operation. Superheated steam is used today in 40,000 railway locomotives; all new power is superheated, and the small percentage left of saturated steam locomotives is fast being modernized by converting them to operate on superheated steam by the application of superheaters. That the railroads, whose locomotives operate for revenue, have practically standardized on superheat, is an indication of what superheated steam has accomplished in railway locomotive service. To owners, operators and manufacturers of small locomotives, therefore, the subject of superheated steam becomes a most timely one to consider.

The installation of the superheater involves the replacement of some of the boiler flues with flues of larger diameter in order to receive the superheater units. Front and rear tube sheets are changed to conform with the altered tube arrangement. The change is simple and inexpensive. In operation, steam from the boiler passes through the throttle valve to a saturated steam chamber in the header located in the front end of the boiler. This chamber serves the purpose of distributing the steam uniformly to the superheater units or elements. These units being located in the boiler flues are in direct contact with the gases of combustion at the same time that these gases pass the boiler heating surface. As the steam passes through these units its temperature is raised and it becomes superheated. In this condition it passes from the units to the superheated chamber, located also in the boiler front end, whence it passes to the engine cylinders. The location of the superheater is of interest because its position does not alter the original locomotive design in so far as taking up limited locomotive space is concerned. The superheater adds very little weight to the locomotive, an advantage of great importance especially where temporary trestles are encountered, limiting the power to the weight on the drivers, because superheated steam increases the locomotive's power for the same weight of engine.

The practical advantages which result from these properties of superheated steam are in general as follows: An increase in locomotive capac-

Two Bucyrus dra... on different sec... sewer project. T... the Bucyrus Cl... on the Wetherby... job is being ... Chicago. The C... in the view on t... the Lanyo Roa... Aldinger of Detr... this section of t... collapsible steel ... both these jobs. ... contracting firm... working on Det... Three-quarters o... tracted for and ... will take two ... present program.

In our October issue we published a ... on J. Robert Bazley's stripping con... recently purchased a 78-C Bucyrus ... rather difficult conditions. It was ... near Shenandoah, Pa., and grades ... in the view on the right. With the ... the photograph on the left, the ... The top view shows the shovel ...

...ators working ... Detroit's new ... the left shows ...ine backfilling ... this part of the ... Nash Bros. of ...cyrus dragline ... backfilling on ... Walbridge & ... contractors for ... Blaw-Knox ... being used on ... of the largest ... country are ... sewer project. ... it is now con- ...mated that it ... complete the ...

...ription of a cave-in which occurred ...anoy Plane, Pa. Mr. Bazley has ...which was moved to the job under ... to move this shovel up a mountain ... 14% were encountered, as shown ... cable snatch, which can be seen in ... these grades without difficulty. ...the top" at the end of the climb.

ity, a saving in fuel and a reduction in the amount of water used by the locomotive boiler.

In an engine using saturated steam an average of 27 lbs. of steam per horsepower is required; in a superheated engine this steam consumption is reduced to 19½ lbs. This saving in steam becomes still greater because of the elimination of condensation in the engine cylinder. The condensation in small locomotive cylinders where saturated steam is used is ordinarily high, hence there is a great saving which superheated steam effects by eliminating this loss.

As a direct result of the saving in water evaporated by the boiler, a corresponding saving in fuel consumed under the boiler results from superheating.

Another direct effect of the reduction in steam consumption is the fact that the capacity of the locomotive is increased. Because the demand on the boiler for steam is reduced, a boiler steam reserve is built up which is available for increased power demands on the locomotive. With the increased capacity available by superheating, four superheated engines can do the work of five similar saturated engines—a distinct advantage where small saturated locomotives are worked to the limit of their capacity and service requirements might call for the purchasing of new locomotives.

Small locomotives frequently are operated at full capacity. With the cylinders taking steam full stroke, boiler capacity is insufficient to supply the necessary steam. Operating superheated locomotives at full capacity is advantageous, because when boilers are worked hard, fire-box temperatures are high, resulting in high degrees of superheat. The fact that greater effectiveness and economy result with the higher steam temperatures is an added advantage to superheated locomotives which are worked hard. The reduction in the amount of feed water, due as we have seen to the decreased amount of steam consumed by the engine cylinders, results in a greater effective engine tank capacity. By conserving water, the superheated locomotive will operate for much longer periods without the delays which would otherwise be necessary to stop and take on water. The time saved is available for useful work, because as we have noted before, these engines are not operated for revenue.

Another important advantage of superheated steam is the fact that the locomotive is "smarter," that it gets under way quicker and saves time in doing its work. Superheated locomotives operate with less smoke than saturated locomotives, due to a reduction in the fuel consumed. This fact is an obvious advantage where locomotives operate in or near large cities where stringent smoke laws are enforced.

To manufacturers of small steam locomotives the superheater is of particular interest and value because the application of the superheater places the small steam locomotive on an advantageous competitive basis in point of economy with other types of small motive power. This fact should be borne in mind by the prospective user of small locomotives and should be carefully considered in the selection of the type of locomotive power best adapted to the service requirements.

In summary, therefore, the advantages of superheated steam in small locomotives may be stated briefly as follows:

First: A reduction in fuel consumption of from 20 to 25%.

Second: A reduction in water consumption of from 25 to 35%.

Third: An increase in locomotive capacity of about 30%.

Fourth: An all-round "smarter" and quicker engine.

Fifth: An engine which will handle a greater tonnage in less time.

Sixth: A locomotive which operates with less smoke.

All of these advantages result in reduced operating costs of small locomotives. The necessity for lower operating costs in small locomotives is urgent, and superheated steam is the practical means to reduce them.

Another "Waste" Product Utilized

What do you say to a board 12 feet wide and 900 feet long?

No, a straight matter of fact statement of an actuality.

You'd like to see the tree that grows it?

As a matter of fact it isn't a tree that makes this 12 x 900 feet board. But the board is being made in New Orleans, and what is more, it is being made from that much discussed waste material of sugar cane fields—bagasse.

A company has recently been organized in New Orleans to make "lumber" of this material. The product will be known as "Celotex."

More than two years have been spent by the officials of this country in perfecting the process that will convert bagasse into "made" lumber. The plant is filled with the very last word in machinery and everything is in readiness to manufacture the largest single board in the history of the world.

The raw material, long an economic problem to our foremost conservation minds, is taken direct from the rollers of the sugar mills that have extracted every drop of the sweet juice from it, baled and sent to the Celotex plant. Here it goes through a simple process and the bagasse rolls out of the finishing end of the machinery, a 12-foot board, three-quarters of an inch thick, and of any length up to 900 feet.

The officers and those responsible for the formation of the new company are all men who have been actively engaged in the fibre and insulating industry for many years, and are: B. G. Dahlberg, president; J. K. Shaw, vice-president; C. G. Muench, vice-president; T. B. Munroe, vice-president; C. F. Dahlberg, treasurer and T. E. Dahlberg, assistant to the president.

—*New Orleans Item.*

SHOTS FROM THE · FIRING LINE ·

Alabama

Sumter County Agent, R. G. Arnold and Guy A. Hart, U. S. Drainage Engr. will make plans for drainage system, reclaiming 15 acres of land owned by J. L. Horn.

Luxapallila Drainage Dist. in Fayette & Lamar Counties, W. M. Suddith, Prest., plans $250,000 bond issue and starting construction of drainage work, reclaiming 22,370 acres; Fayette County also plans developing drainage district along Sipsey River, reclaiming 12,000 acres.

Canada

Eastern News

R. ST. JOHN, MONTREAL

Reid, Farnsworth & Shaffner, Annapolis, N. S., are awarded general contract for construction of road for Provincial Highways Board, Hollis Street, Halifax.

A new incorporation is The Canadian Construction Co., Limited, with head office in Montreal. Capital $299,000.00, to carry on the business of general contractors.

A new incorporation is The Three Rivers Construction Co., Limited, with head office in Three Rivers, Que. Capital $49,000.00. To manufacture and deal in brick, tile, cement, plaster, stone, etc.

Work will commence immediately on the extension of the C. P. R. branch from Mattawa to Kipawa, Ontario, for a further sixty-eight miles through rich farming country into Des Quintze, where large water powers are located. It was announced recently that the contract of constructing the road, which for the present will be for colonization purposes, had been awarded to Angus & Taylor, Limited, contractors of North Bay, Ont., and that before the first of September next, thirty miles of the road will be laid.

The contract also provides for the construction of an eight-mile branch into Ville Marie on Lake Temiskaming. The scheme is looked on with keen interest in the north in view of the relief which will be afforded the unemployment situation, and also in view of its significance as a step forward in the interprovincial railway to James Bay.

The associated Boards of Trade of Temiskaming District, Ontario, met recently at Haileybury and prepared a memorandum for presentation to the Provincial Government, asking for a yearly expenditure of $2,250,000 on good roads in the northern part of the province.

Sealed tenders for sections three and four of the Welland ship canal, addressed to Mr. J. W. Pugsley, Secy. Department Railways & Canals, Ottawa, were received October 5th.

This contract is for the completion of sections three and four, and we expect it will amount to a sixteen or eighteen million dollar job.

A ten million dollar power plant will be erected at Grand Falls, Manitoba. The work is under way on the development of 168,000 H. P. on the Winnipeg River. They expect to have same completed in 1924. This is a big undertaking and should go a long way towards stimulating industry in general. This is what the new power development means to Winnipeg and Manitoba:

Employment of from 1000 to 2500 people; average monthly wage bill of $125,000.

Purchase locally of supplies and provisions for employees on works amounting to over $20,000 each month.

Purchases through local houses of equipment and tools totalling over $750,000.

Purchase of 160,000 barrels of cement from local plants.

Purchase of 2000 tons of structural steel from local shops.

Purchase of 100,000 brick from local yards.

Purchase of 2,000,000 feet of lumber from local yards.

Erection of terminal station in Winnipeg at cost of over $500,000.00.

Bringing to Winnipeg and vicinity new industries when power is available, employing large numbers of men.

Assures future development of Winnipeg as thriving manufacturing city.

Guarantees to Winnipeg and vicinity an unfailing supply of cheap power.

The Temiskaming & Northern Ont. Ry. Commission placed before Premier Drury at a conference at North Bay recently, a recommendation that the T. & N. O. be extended sixty miles and farther north from Cochrane, and that the Nipissing Central be extended around the head of Lake Temiskaming from New Liskeard. After the conference the Premier announced that he would lay the recommendations before the Cabinet immediately and an early decision would be given. He said that the Government's policy with regard to the North Country would be dictated from the viewpoint of the welfare of the whole province, rather than by local sentiment. Colonel L. T. Martin, one of the T. & N. O. Commissioners, said that the outlook for the northern district looked bright, with the gold mining industry prosperous and silver again expanding. The trend of developments in Northern Ontario, said Colonel Martin, are entirely satisfactory.

The T. & N. O. Railway extension work will be commenced this winter upon a 70-mile right-of-way northward out of Cochrane to Smoky Falls. The estimated cost of the extension is $3,500,000.00. The decision of the Government to go ahead with clearance and construction was announced today by Premier Drury upon his return to Toronto, following a conference with members of the T. & N. O. Commission in Northern Ontario. Besides tapping a country of wonderful agricultural, lumbering and mineral possibilities, the new line will pass the big power development on the Frederick House River. While the extension has long been urgently pressed by north countrymen as necessary to the development of Northern Ontario, the Premier said that early commencement was partially with a view to relieving unemployment.

Porter Brothers & Standifer are getting well away for a start on their contract for the completion of sections one and two of the Welland Ship Canal. They have been seriously handicapped by labor troubles, but we note from newspaper reports that these are now settled.

A movement is on foot at Murray Bay for the construction of a highway from Quebec City to this city.

Geo. Atwell & Company are getting along very nicely with the excavating for the new Mount Royal Hotel, at Montreal. They are working night and day so as to get the work done within the time limit, and are using three small revolving shovels and about eighteen Mack 5-ton trucks.

The writer met Lester Simmons, General Supt. for Doheny, Quinlan & Robertson, Contractors for Section 3, Welland Ship Canal, when in Toronto recently. Mr. Simmons is looking very well and hoped that his people would get the contract for the completion of section No. 3, also section No. 4, tenders for which were recently called for.

Mr. Angus Sinclair, well-known Toronto Civil Engr. and Railway Contractor, died at his home in that city recently. Mr. Sinclair was born at Chatham, N. B. in 1849. He was on the engineering staff of both the Intercolonial & Canadian Pacific Railways. He later went

into business as a railway contractor and constructed quite a number of miles of road for the C. P. R. and C. N. R. in Ontario and the Maritime Provinces.

Considerable progress has been made this year on Ontario's Provincial scheme, comprising a system of 1,800 miles of interurban highways, benefiting all parts of the Province.

The death is announced at Perth of James Stewart, for many years a railroad contractor well known in Eastern Canada. He had built lines in this Province, Ontario and Quebec. He was born in Prince Edward Island 73 years ago.

The Provincial Highways Department will undertake a considerable amount of important road and bridge work in the vicinity of London, Ont., some of it to be undertaken at once and the remainder to go on the program for next year. The present Brougdale Bridge on the Proof Line road is to be replaced by a new structure, the work to commence almost at once. A new bridge is also to be built south of Lambeth. It has been decided to continue the Lambeth concrete road to St. Thomas, but this will not be undertaken until next year. The construction of a road to connect the Longwood and Talbot roads from a point at or near Glencoe to Dutton, and thence to the Talbot road by the Dutton road, is under consideration.

Western News

The Lebarron scheme which was initiated in 1917 for dredging the Fraser River to a depth of 10 ft. and a width of 150 ft. from New Westminster to the mouth of the river, will be completed this fall, according to a report presented at a recent meeting of the local Board of Trade by A. J. Paton.

John Callaghan, of Calgary, Alta., has been appointed as Deputy Minister of Railways and Telephones by Hon. V. W. Smith, minister of that department in the new Alberta Government. Mr. Callaghan will also act as manager of the Alberta Government's railway lines. At one time he was chief engineer of construction for the Pacific & Great Eastern Railway, and recently has been with the C. P. R. in Calgary.

The T. R. Nickson Construction Co. was awarded the contract for repairing the Marine Drive Capilano bridge at West Vancouver, and the construction of protecting wing dams, for $26,826.

The water power of the Campbell River, Vancouver Island, will be developed by British interests, according to a statement recently made by Hon. T. D. Patullo, Minister of Lands for British Columbia.

Canal Zone

There was no movement of consequence at Cucaracha slide during the month of August. A slow, general movement has continued just north of Purple Rock, being recorded as far back as 1,200 feet east from the prism line, and a slight independent movement occurred to the south of this rock. Little, if any, of this material has reached the Canal prism. A Bucyrus dipper dredge, working from the 1st to the 21st of the month in front of this slide, removed during that time 98,850 cubic yards of material, making a total of 2,835,900 cubic yards removed from this slide area since February 22, 1920.

Culebra and Barge Repair slides have showed no important movements during the month. During the month dredges removed 86,550 cubic yards of material from East Barge Repair slide, and 6,700 cubic yards of material from West Barge Repair slide.

The total excavation in August, including earth and rock, was 560,100 cubic yards. Of this amount the Bucyrus dipper dredge Gamboa removed 126,550 cu. yds., and the dipper dredge Cascadas, also a Bucyrus, removed 57,800 cu. yds.

No inconvenience to Canal traffic was occasioned by any of the slides.

Illinois

More than one thousand bids offering to pave 189 miles of road in the state highway system were received October 4th when the Illinois Highway department met building contractors in the final road letting session of the season.

Hundreds of contractors from points throughout the middle west and delegations of Illinois citizens come to demand action on long-delayed highway improvements near their homes; material men and motor club representatives filled the capital. Paving, grading and bridge construction were included in the bids received. The average total cost per mile for improved highways was approximately $37,500.

Indiana

Mr. Wm. Gaum is running a Bucyrus 225-B, stripping coal for the Enos Coal Co., at Oakland City.

Iowa

On September 30th bids were received for grading and draining 16.66 miles from the Cedar county line east toward DeWitt. At this letting twenty-two bids were received for the work on the west 6.27 miles, and twenty bids for work on the east 10.39 miles. Contracts were awarded as follows:

To F. J. McCaughey, Chicago, Ill.
78684 cu. yd. excavation at 27.4c per cu. yd.

To McAndrew & Hannahs, Keokuk, Iowa.
65649 cu. yd. excavation at 27c per cu. yd.

To Mason City Brick and Tile Co., Mason City, Iowa.
6″ farm tile material at 5.4c per ft.
8″ farm tile material at 8.3c per ft.
10″ farm tile material at 15.2c per ft.
12″ farm tile material at 19.8c per ft.

To T. H. Dosland, Calamus, Iowa.
10196 ft. 6″ tile labor at 7c per ft.
300 ft. 8″ tile labor at 10c per ft.
600 ft. 10″ tile labor at 10c per ft.
4 Type A intakes at $30.00 each.

To C. A. McCoskey, Webster City, Iowa.
46870 ft. of 6″ tile labor at 6.95c per ft.
6755 ft. of 8″ tile labor at 8.5c per ft.
5143 ft. of 10″ tile labor at 11.0c per ft.
2150 ft. of 12″ tile labor at 15.0c per ft.
21 Type A intakes at $25.00 each.
7 Type B intakes at $20.00 each.

Louisiana

McWilliams Co., 908 McLemore Ave., Memphis, Tenn., has contract for improving drainage system, near Plain Dealing, approximately 365,000 cu. yds. excavation.

New Mexico

Sealed proposals will be received at the office of the State Highway Commission, Capitol Building, Santa Fe, New Mexico, on November 2, 1921, at the hours as stated below for the construction of two Federal Aid Road projects as follows:

9 A. M.

Federal Aid Project No. 57, Chaves County. Length of Project 14.242 miles. Located between Roswell and Kenna, N. M.

Approximate Quantities

30969 cu. yds. Class 1 excavation.
12188 cu. yds. Class 1 borrow.
3615 sta. yds. overhaul.
5.019 miles crowning and shaping.
11398 cu. yds. one course gravel surfacing.
405 cu. yds. earth or clay plating.
146 cu. yds. cement rubble masonry.
96 lin. ft. 18″ diam. 16 ga. corr. metal culvert.
754 lin. ft 24″ diam. 14 ga. corr. metal culvert.
48 lin. ft. 30″ diam. 14 ga. corr. metal culvert.

171 cu. yds. Class A concrete.
138 cu. yds. Class B concrete.
2976 lbs. reinforcing bars.
1492 lin. ft. asphalt expansion joint.
5373 lin. ft. moving fences.
2 each, gate and cattle guards.

BRIDGES

130 cu. yds. Class A concrete.
8427 lbs. reinforcing bars.
61.184 M. B. M. wooden superstructure.

10 A. M.

Federal Aid Project No. 63, Curry County. Length of project 13.024 miles. Located between Clovis and Grady, N. M.

Approximate Quantities

14166 cu. yds. Class 1 excavation.
228 cu. yds. Class 2 excavation.
50 cu. yds. Class 3 excavation.
6228 cu. yds. Class 1 borrow.
465 sta. yds. overhaul.
7.564 miles crowning and shaping.
40641 cu. yds. two course caliche surfacing.
312 lin. ft. 18″ diam. 16 ga. corr. metal culvert.
48 lin. ft. 24″ diam. 14 ga. corr. metal culvert.
48 lin. ft. 30″ diam. 14 ga. corr. metal culvert.
24 lin. ft. 36″ diam. 14 ga. corr. metal culvert.
23.5 cu. yds. Class A concrete.
29.96 cu. yds. Class B concrete.
1299 lbs. reinforcing bars.
19724 lin. ft. moving fences.

BRIDGES

194.1 cu. yds. Class A concrete.
12322 lbs. reinforcing bars.
33.852 M. B. M. wooden superstructure.

Forms for proposals, instructions to bidders, plans and specifications for Federal Aid Project No. 57, may be examined at the office of District Engineer, Roswell, N. M.; for Federal Aid Project No. 63, Curry County, at the office of the District Engineer Santa Rosa, New Mexico; for both projects at the office of the State Highway Engineer, Santa Fe, New Mexico. Layout, typical cross-sections and structure lists together with forms for proposals will be mailed on application. It is not contemplated to mail any plans to prospective bidders.

The State Highway Commission reserves the right to reject any and all proposals.

L. A. Gillett, State Highway Engineer, Santa Fe, New Mexico, October 6, 1921.

Northern States Notes

Charles Schumacher, 1319 6th St. So., Fargo, N. Dakota, was successful bidder on a portion of State Road No. 7 in Clay County, Minn.

Dow & Schreiber, Watertown, South Dakota, were successful bidders for the construction of fourteen miles of the Huron-Wolsey Road in Beadle County, South Dakota.

The following were successful bidders for road work let by the Commissioner of Highways for the State of Minnesota on September 27th:

State Project No. 13—23, C. F. Johnson, Center City, Minnesota.

State Project No. 10—38, Turnham & Turnham, Long Lake, Minn.

State Project No. 10—39, Day-DeVoe Company, 700 Jackson St. N. E., Minneapolis, Minn.

E. F. Remer, Hibbing, Minn., has been awarded Road Job No. 2111 in St. Louis County, Minn.

A. Guthrie & Co., St. Paul, Minn., were successful bidders on Road Job No. 2103 and 171 in St. Louis County, Minn.

Geo. W. Condon, Omaha, Nebr., has received contract for road work in Plymouth County, Iowa, comprising 107,323 cu. yds. of earthwork at 15.4c per cu. yd.

All bids were rejected which were received by the County Auditor of Redwood County, Minnesota, on October 7th and 8th for the construction of Ditches 33 and 52.

Notes from the Pacific Coast

BY P. H. BIRCKHEAD, C. W. WHITNEY AND L. T. RUSSELL

D. W. Pontius, General Manager of the San Diego & Arizona Railway, will be named Vice President and General Manager of the Pacific Electric Railway at the next meeting of the board of directors. The position for which he is slated was made vacant early in the month by the promotion of H. B. Titcomb to be president of the Southern Pacific de Mexico Railway.

Homer J. Gault of the Federal reclamation service has prepared a report and an estimate of the cost of the proposed Iron Canyon irrigation project. The total cost of the work is estimated at over $37,000,000. The storage dam, which will be located six miles northeast of Red Bluff, will be about a mile in width and about 160 feet in height, and is estimated to cost about $15,000,000. The main canal, which will be about six or nine miles in length, is estimated to cost about $11,000,000; the laterals are estimated to cost about $8,000,000. The project is being promoted by the Sacramento Valley Development Association. W. A. Beard of Sacramento is the secretary. No statement has been issued regarding the probable time that bids will be invited for this work. An announcement of the plans of the development association regarding this work will be made by the secretary in the near future.

An additional dredge will be installed on the Indian marsh lands on the upper Klamath Lake project in Oregon, where the California-Oregon Power Company is reclaiming 10,000 acres under a contract from the government.

Preparations are now under way at the plant of the Yuba Manufacturing Co., Marysville, Calif., for the construction of three big gold dredges, the cost of which will total $3,000,000. Several hundred men will be given employment.

Bids will be received up to October 27th, by City Clerk Wilbur W. Easton, for the construction of about 29.11 miles of sewer in East San Diego, Calif. The work involves:

92,689 lin. ft. 6″ vit. pipe.
60,343 lin. ft. 8″ cement pipe.
541 lin. ft. 6″ cast iron pipe.
132 lin. ft. 8″ cast iron pipe.
6,550 6″ Y branches.
4.257 8″ Y branches.
45 cu. yds. concrete piers.
443 concrete manholes.
53 concrete flushtanks.

Contract for this work was previously awarded to B. B. Boyd, 3796 Menlo St., E. San Diego, who bid $249,879, but this action was rescinded on account of an irregularity in his bid. E. Paul Ford is City Engineer, from whom plans may be obtained by deposit of $20.00.

The new California highway between Los Gatos and Santa Cruz was formally opened at Santa Cruz a short time ago. The improvement shortens the route from Frisco to Santa Cruz. The former road, necessitating a journey of about 125 miles, is now cut to 75 miles.

In order to fittingly honor the heroic dead who made the supreme sacrifice during the great world war, the patriotic cities of California, Nevada, Colorado, and other states are agitating for the construction of what is to be known as the Victory Highway, an improved road which will stretch from the Pacific to the Atlantic, the most

desirable and accessible route having already been selected. This will in time be distinctly marked, and there will be a number of improved byways and laterals where enterprising towns cannot be touched by the main undertaking.

The two lowest bids presented to the California Highway Commission for the construction of about ten miles of improved roadway between Ignacio and Fairville, in Marin and Sonoma counties, were made by Grant Smith & Co., San Francisco, and by R. J. Blanco of Vallejo, the Smith proposal being $138,204 and the Blanco bid, $191,652. Both bids were about 8 per cent below the estimates of the commission, which indicates that prices for construction work are beginning to recede in a manner that will stimulate projects where high prices kept improvements at a restricted point.

The American Consul at Guaymas, Sonora, Mexico, advises the San Francisco Chamber of Commerce that indications point favorably to the construction of a harbor at Rocky Point, in St. Georges Bay, Gulf of California, a situation about 100 miles north of Guaymas. A number of harbor experts, divers and railroad construction engineers were recently sent to Rocky Point by the Tucson, Gila Bend and New Cornelia railroad with the object of reporting on the feasibility of constructing a safe and convenient tidewater terminal at that place, to serve as an outlet for the products of the Arizona copper mines. The counsel was informed that the point holds many advantages for a harbor, among them being deep water, anchorage, a good beach, and above all, its nearness to the point of mineral production in Arizona, it being located about 105 miles from Ajo, to which place the railroad is already constructed.

The Stone Canon Coal Company has been taken over by new capital and the coal mine in the southern part of Monterey County, which by the way, is said to be the only mine of real coal in the state, will be operated on a large scale. Willett & Burr were given the contract for rebuilding the Stone Canon Railroad which had not been in operation for years, and they now have the work well under way. This road connects the mine at Stone Canon with the Southern Pacific Ry. near San Miguel, Calif. The line is about twenty-one miles long.

As soon as the Madera Irrigation District disposes of its litigation with Miller & Lux, this District will be in a position to go ahead with its big construction program, which includes the building of the largest irrigation dam in the world and hundreds of miles of canals. The dam will contain about one and a half million cubic yards of concrete. Bonds have been voted in the amount of twenty-eight million dollars.

Leon Bly, who has been working for several years on an irrigation proposition in Lassen County, known as the Eagle Lake project, has organized two irrigation districts and has sold them the project as a completed irrigation system, taking their bonds for same. He has disposed of these bonds at a price which leaves sufficient funds to complete the construction work and Mr. Bly a well-earned profit. He has let the construction work to Grant Smith & Co., at a contract price of about one million dollars and they have already started work on the tunnel at Eagle Lake. Work on the canals and laterals will probably not be done until next year because the working season for such work is now nearly over.

Active steps to have some 20,000 additional acres west of Williams and Maxwell annexed to the Glenn-Colusa Irrigation Dist. have been taken with the circulation of petitions among the land owners, pledging them to pay 10 cents an acre for the preliminary work.

Announcement has recently been made that the proposed $30,000,000 hydro-electric power and irrigation project on the Middle Fork of the Feather River will receive financial backing from Harry Payne Whitney of New York and Bulkeley Wells of Denver and Boston. A permit to erect the huge power plant on the Feather River was asked recently by the Federal Power Commission in Washington by Lars Jorgensen, engineer of San Francisco. More than $500,000 has already been expended for irrigation and power sites and other rights. It will require $3,000,000 more to develop the irrigation part of the big power scheme.

Tentative plans are under way for the irrigation of approximately 15,000 acres of land along the Sacramento river in the district about 10 miles northwest of Chico.

Contract was awarded on Sept. 9th by the Bureau of Yards and Docks, Washington, D. C., to Union Construction Co., San Francisco, who bid $0.74 per cu. yd. for 100,000 cu. yds. of rock excavation from easterly end of Mare Island.

If protests are over-ruled for the removal of Rincon Hill, San Francisco, the project will be rushed and bids for the work will be called at once. The work will involve 3,000,000 cu. yds. of excavation, mostly rock, and is estimated to cost $4,000,000.

Contract has been awarded to Olympian Dredging Co. of San Francisco, who bid .0934 per cu. yd. for clamshell dredge work consisting of enlarging and completing about 4 miles of the east levee of the Sacramento River near the town of Hood, involving approximately 200,000 cu. yds. of material.

Plans are being made by Consulting Engineers, Beckman & Linden, San Francisco, for the construction of works for the Paradise-Verde Irrigation District, located 10 miles north of Phoenix, Arizona. Plans call for the construction of 5 dams; 65 miles of reinforced concrete lined canal; and lateral system for 96,600 acres. Call for bids for the work will be issued in about 6 months. Source of water is the Verde River and smaller streams.

Contract has been awarded to the Ross Construction Co. Sacramento, who bid $129,563.00 for the construction of an 1,100 ft. extension to the Quay wall at the Naval Base, San Diego.

Contract has been awarded to the San Francisco Bridge Co., who bid 20.14c per cu. yd. for dredging and filling at the San Diego Naval Repair Base, to be completed within 200 days.

Contract has been awarded to J. A. Modin, Byron, for excavation and earth work for the Knightsen Irrigation District. This work will be done by scrapers and teams.

Southern California Edison Co., Fresno, has been authorized by the Railroad Commission, for the construction of a hydro-electric plant on Big Creek, Fresno Co., 5¾ miles of tunnel and a dam in the San Joaquin River. Total estimated cost $11,500,000.00.

Plans are being prepared by engineers Polk & Robinson, Chico, for excavation and drainage work for Drainage District Nos. 100 and 200, and the Butte Creek Drainage Districts. Work will involve approximately 300,000 yds. of excavation in Butte Creek.

Plans have been completed for the construction of the Cave Creek Flood Control Dam, 20 miles from Phoenix, Arizona. The dam will be earthfill with reinforced concrete core and Amberson type of deck dam. Dimensions of dam are 1200 ft. in length and 58 ft. high. Bids are being asked for.

Bids were received October 10th by the Supervisors of Los Angeles County, for the construction of about 9,000 ft. of channel 15 ft. wide, involving about 190,000 cu. yds. of earthwork from the S. P. R. R. Station at Vinvale to the Los Angeles River. Earth excavated will be used for dikes.

Plans have been made for dredging a 20-ft. channel to the Municipal Wharf, Long Beach, Calif. Work involves about 251,000 cu. yds. of dredging. Estimated cost $75,000.00.

Montague O'Reilly Company were successful bidders on quite a piece of road work near Reedsport, Oregon and are now engaged in getting their work under way.

A. Guthrie & Co. are working night and day on pier footings for their bridge work near Oregon City and expect to have the concrete work above the water level at

an early date. This is quite an important bridge job as it spans the Willamette River near the old suspension bridge,

Ray & Seidel are using quite a lot of teams on their road work between Kelso and Kalama, Washington. We understand the job is to be completed by November 1st.

Steam shovel engineer Philbrook was a welcome caller at Portland recently. Mr. Philbrook is just in from the vicinity of Chehalis, Washington, where he has been employed for nearly two years by Graham Bros. on an Erie shovel.

The Puget Sound Bridge & Dredging Company are using their 24-inch dredge on the Sumas Reclamation Project just across the line in British Columbia. This dredge has recently been remodeled, a new electrically driven pump having been installed, in fact the entire dredge is now electrically driven.

Mr. John Hampshire was a successful bidder recently on some highway work in southern Oregon. This was fairly light work, so we are informed, and has been practically all covered by station men.

Business conditions in the Northwest have not changed greatly in the last three months. There seems to be a decided improvement quite recently in the lumber situation and indications are this will continue.

Southern States Notes

Belzoni Drainage District, C. E. Miller, Engineer, Belzoni, Miss., has purchased a 1½-yard dipper dredge from the Callahan Construction Co., which will be used for cleaning-out work.

Silas A. Lacy, Anniston, Ala., was a caller recently. Mr. Lacy has his Class-9½ Bucyrus dragline busy in Louisiana on railroad work.

O. C. Kulicka, Engineer Bogue Phalia Drainage District, Greenville, Miss., is figuring on enlarging and cleaning-out several miles of drainage ditches near Greenville.

The Dixie Construction Company, Birmingham, Ala., will use a 70-C Bucyrus Shovel to handle the rock at their quarry near Verbena, Alabama.

The Harvey Construction Company, Memphis, Tenn., were awarded 12 miles of road work by Dyer County, Dyersburg, Tennessee.

Sparkman Brothers, Dyersburg, Tenn., were successful bidders on 12 miles of road work in Dyer County.

Dover & O'Shields, Montezuma, Ga., were successful bidders on some road work let by the Lee County Commissioners, Leesburg, Ga.

Tupelo Dredging Company, Tupelo, Miss., was the successful bidder on drainage canal construction work let by the Northern Drainage District, Bolivar County, Mississippi.

The Acme brick plant, of Denton, Texas, has resumed operations after a shut-down of several months. A crew of thirty men was put to work by Manager A. B. Kelley, and he expects to increase the number to about seventy-five men.

Jefferson County Commissioners, of Drainage District No. 6, Beaumont, Tex., let contract to the Lake Arthur Dredging Company to remove 1,000,000 cubic yards of dirt cleaning out Hillebrandts Bayou and constructing laterals.

The State Highway Commission of Alabama recently let contract to Etowah County to construct 10 miles of the Birmingham-Gadsden highway.

The State Highway Commission of Alabama recently let contract to Stanley & Singer Construction Company, La Fayette, Ala., to construct 18 miles of road in Clay County.

The Western Wheeled Scraper Company's office and warehouse at Memphis has been moved to 91 South Front Street. Mr. C. S. Miller, Memphis Representative, will be glad to have his many friends call on him at his new location.

A. O. Bourdon is operating a Class-14 Bucyrus dragline excavator for List & Gifford Construction Company at Kleburg, Texas.

C. L. Flournoy of Jasper, Texas, has been operating one of his shovels on some road work for Collum & Harralson, of Dallas, Texas. This work is completed and the owner will be interested in hearing from anyone who has shovel work to be done. The shovel is in charge of Mr. E. E. Willis, who can be reached at 2404 Ross Ave., Dallas, Texas.

Vilbig Brothers have a contract with the city of Dallas, Texas, for the excavation work for a filtering plant at White Rock Lake. There is a large amount of both dirt and rock work in this contract. Vilbig Bros. will use their revolving shovels on the work.

REVIEW OF BOOKS and CATALOGS

We shall be glad to review, in this column, such books and catalogs as are sent to us. Books reviewed in these columns will be supplied by The Excavating Engineer Publishing Company at the price named.

STEDMAN NATURALIZED FLOORING—4 pages, 8½" x 11", describing the various uses of this improved flooring. Color plates, pattern designs, and details of construction are included. Stedman flooring can be used wherever a durable floor is necessary, and there are many different styles for different purposes. *Stedman Products Co., South Braintree, Mass.*

HAISS CREEPER PATH DIGGING LOADER—8 pages, 6" x 9". A well-illustrated booklet showing various uses of this loader, giving construction details of the creeper tread and other parts of the machine. Detailed specifications are included. *The Geo. Haiss Mfg. Co., Inc., 140 St. and Rider Ave., New York City.*

QUARRY CAR PRACTICE—32 pages, 7" x 9". This booklet consists largely of illustrations of quarry cars in actual use in various quarries. Many different types of cars are shown, under varying conditions of operation. As cars play an important part in quarrying operations, this carefully prepared booklet will no doubt be of considerable interest and value to quarrymen. *Easton Car and Construction Company, Easton, Pa.*

HIGHWAY RESEARCH PERTAINING TO CONCRETE ROADS—7" x 10" booklet. In the interests of better concrete roads the Columbia Steel Company of San Francisco, Cal., have built a test highway at Pittsburgh, Calif. The length of this test highway is 1371 feet and it is made up of 13 sections of various kinds of concrete roads, constructed with and without reinforcing. This highway will be tested to destruction by truck traffic. This booklet gives detailed information in regard to the construction of various sections of the highway. Copies may be obtained from the *Columbia Steel Co., San Francisco, Calif.*

HAISS PATH DIGGING WAGON LOADERS: 6" x 9" catalogue, 8 pages, showing the work which the Haiss Path Digging Wagon Loader can do. This booklet is well illustrated with numerous photographs showing the wagon-loader on different kinds of jobs. An unusual feature of Haiss wagon loaders is the self-feeding mechanism which insures a steady stream of material. This is fully described in the catalogue. *George Haiss Manufacturing Company, 140th Street and Rider Avenue, New York City.*

INTERNATIONAL MOTOR TRUCKS FOR ROAD WORK: 32-page, 9" x 12" catalogue. This unusually attractive, well-illustrated catalogue shows very completely how International Trucks may be used in all branches of road building. Numerous illustrations showing In-

ternational motors on all kinds of road building jobs are given. A complete description of the various special bodies with which this truck may be equipped for various municipal uses is also given. Details of the construction are included. *International Harvester Company of America, Chicago, Illinois.*

TRADE NOTES

The partnership of Henry Harig and William Harig, heretofore operating under the name of H. Harig & Company, has been dissolved and the interests of Henry Harrig have been taken over by William Harig. The company is now operating under the name of The William Harig Company, and is specializing in building construction. Their address is Harrison Building, Cincinnati, Ohio.

Mr. Geo. L. Sawyer, formerly Sales Manager of material handling machinery for Barber-Greene Company, of Aurora, Illinois, has been appointed to represent the Universal Crane Co. in the New York field in the sale of Universal Cranes. His offices are at Allied Machinery Center, 141 Center St., New York City, New York.

Keen interest in the Universal Crane has been shown throughout the territory due to the crane's adaptability to so many types of mountings and its great flexibility and economy in almost all material handling fields.

The big time-saving feature this crane possesses by reason of its ability to be mounted on motor trucks and trailers on which it can be moved from place to place several times as fast as other full-revolving cranes, is one that attracts those men who are studying their handling costs, and trying to reduce them.

The Blaw-Knox Company wishes to announce the addition to its staff of Mr. H. O. Davidson. Mr. Davidson will have entire charge of the Prudential Sectional Building Department of the Blaw-Knox Company and will be also General Manager of the C. D. Pruden plant of the Blaw-Knox Company. Mr. Davidson will be located at the C. D. Pruden plant at Baltimore. Mr. Davidson was connected for eight years with the Hydraulic Steelcraft Company, being General Manager of that organization at the time he severed his connections to become a member of the Blaw-Knox staff.

The General Fireproofing Company's *Self-Sentering* has met with such success that a new product has been developed called *Diamond Rib Lath* for use in suspended ceilings or walls and in connection with Steel Tile and Steel Lumber floor construction.

Diamond Rib Lath is similar to *Self-Sentering* and contains the standard *Self-Sentering* diamond mesh which is the strongest and most effective type of mesh, stiffened by cold drawn U-shaped ribs 4.8″ on centers and approximately ⅜″ in height. The mesh in *Diamond Rib Lath* forms a perfect base and key for plaster while the ribs give it the strength necessary to span a wider spacing of supports than is common for ordinary flat laths.

All of the metal in *Diamond Rib Lath* is effective reinforcing for the plaster thereon, and gives a firm, rigid plastering base requiring a minimum of mortar.

Wider spacing of supports means a saving of material and labor, which, in connection with the ease with which *Diamond Rib Lath* may be handled and placed, makes its use desirable to Architects and Contractors who are seeking best results.

All sheets are 24″ in width and in standard length of 8′, finished in 24, 26 and 28 gauges.

Write to the Engineering Service Department of The General Fireproofing Company, Youngstown, Ohio, for a sample of this lath which will be very gladly furnished at your request.

Alignment Work Over the Tehachapi Grade on the Southern Pacific

(Continued from page 368)

other photograph shows a heavy slide which the shovel was removing.

This work was carried on under the Operating Department of the Southern Pacific under the general direction of Mr. W. H. Kirkbride, Engineer of Maintenance of Way and Structures, and directly under the supervision of Mr. T. A. Bordwell, Division Engineer of the San Joaquin Division. Mr. E. L. Marsh had direct charge of the operation for the contractors.

The Steam Shovel—Builder of Worlds

(Continued from page 369)

that they have for the past fifteen years, the use of concrete for building construction and road work would still be in its infancy; many million tons of coal would still be untouched in the ground; and the commerce of the world would still be batting its way around the Horn.

Out Of Habit

Flossie Gay.—"You'll never catch me again going out to dinner with an editor!"

Her Friend.—"Was he broke?"

Flossie.—"I don't know whether he was broke or not, but he put a blue pencil through about half my order!" —*Exchange.*

Clamshell Buckets are built with steel flat-link side-chains, heavy steel plate ore bowls, cast steel bowl arms, bowl braces, teeth, bucket head, and replaceable bronze bushings. Several types for various purposes.

GEORGE HAISS MFG. CO., Inc.

140th Street at Park Avenue NEW YORK, N.Y.